Policy Implications of the Euro-Med Partnership: The Case of Jordan

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Abstract

This paper has two main purposes: (i) assessing the effects on the Jordanian economy of the implementation of the Association Agreement (AA) with the EU, and (ii) drawing implications for domestic fiscal policy accompanying the trade liberalisation process. The AA between Jordan and the EU entered into force in 2002. It eliminates progressively tariffs on industrial goods imported by Jordan from the EU. Custom duties on agricultural products are gradually and only partially eliminated. The Agreement aims eventually at creating a free-trade area between the EU and Jordan within 12 years by its entry into force. Given the negative impact of trade liberalisation on revenue of the Jordanian government, counteracting fiscal measures are required in order to offset the loss in government revenue. In order to capture intertemporal and intersectoral effects brought about by trade liberalisation on the Jordanian economy, a multisectoral and dynamic CGE model is specified and calibrated.

Key words: dynamic computable general equilibrium, Jordan, trade liberalisation, fiscal policy.

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1 Introduction

The Euro-Mediterranean Association Agreement between Jordan and the European Union (EU) was signed in November 1997. It is part of a larger programme, the Euro-Mediterranean Partnership, that began with the 1995 Barcelona Declaration and involves through a network of bilateral relations the EU and countries in the Middle East and North Africa (MENA) region[1]. The Euro-Jordanian Association Agreement entered into force on May 1st, 2002, and replaces the 1977 Cooperation Agreement. The Association Agreement allows imports into the EU of Jordanian products free of custom duties and free of quantitative restrictions, with the exclusion of agricultural products. Custom duties and charges on imports into Jordan of EU products are progressively abolished, and duties on agricultural products are gradually and partially eliminated. The Agreement aims eventually at creating a free-trade area between the EU and Jordan within 12 years by its entry into force.

Trade liberalisation in the form of a preferential trade agreement (PTA) with the EU is expected to provide benefits for Jordan in terms of trade creation, and lower consumer prices, that bring about a rise in welfare, and increased competition in the domestic economy. A key role in such a process is played by investment demand, that is potentially important to the dynamic behaviour of output over the long-run (Francois et al., 1997). On the other hand, trade liberalisation has some unpleasant effects on the Jordanian economy. There is clearly a loss in government revenue, due to foregone import tariff duties. Such an impact is likely to be particularly strong for Jordan, where government revenue relies heavily on custom duties[2]. Furthermore, opening up domestic trade to foreign competition is likely to be a painful process in terms of displacement of labour force in the formerly protected sectors. In the short-run this fall in employment might not be fully compensated by job creation due to expansion in other sectors, and might determine a transition period in which there are winners and losers.

The policy implications for Jordan therefore suggest that the government should accompany the trade liberalisation process with appropriate

[1] The countries involved in the Euro-Mediterranean Partnership are Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, the Palestinian Authority, Syria, Tunisia and Turkey.

[2] Import duties from EU trade in Jordan in the period 1994-96 averaged 12% of total tax revenue and 2% of GDP, total import duties averaged more than one-third of total tax revenue and about 6% of GDP (Abed, 1998).

economic measures, such as reform and modernisation of the tax system and broadening of the tax base in order to counteract the adverse effects on revenue due to the reduction in custom duties.

As measures of fiscal reform, the Jordanian government has harmonised the General Sales Tax (GST) rates on domestic and imported goods, has replaced the GST, introduced in 1994, by a Value-Added-Tax(VAT)-like sales tax in 2000, and has undertaken an income tax reform in 2001.

Previous studies on Jordan's trade liberalisation by Hosoe (2001) and by Lucke (2001) have investigated the effects of opening up Jordanian trade by using static computable general equilibrium (CGE) models. Hosoe simulated the impacts of two trade policy scenarios for Jordan, the Uruguay Round implementation and the establishment of a free trade area with the EU, by using a model based on Devarajan et al. (1990). Simulation of the Uruguay Round shows that its implementation would lead to trade creation in imports and exports and would increase Jordan's welfare by 0.28%. The EU-Jordan FTA scenario would further increase Jordan's welfare by 0.16%, would increase the two-way trade between the EU and Jordan, but it would determine trade diversion favourable for EU imports. The work by Lucke focuses on fiscal effects of the EU-Jordanian Association Agreement, and discusses fiscal responses aiming at overcoming the loss in government revenue, such as simplifying and harmonising tax rates, and broadening the tax base.

The paper is structured as follows: Section 2 explains briefly the methodology, Section 3 describes the model, Section 4 presents data and calibration, Section 5 analyses the results of the simulations, and Section 6 draws the main conclusions.

2 Methodology

In order to assess the effects of Jordan's trade liberalisation on the domestic economy, a computable general equilibrium (CGE) model is specified and calibrated.

Computable general equilibrium models rely on social accounting matrix (SAM) to capture national income, production and input-output information, and aim at simulating and evaluating economic policies. The use of CGE models for policy analysis has become widespread for a wide range of applications. In this paper a dynamic neoclassical CGE model is based on the 1998 SAM for Jordan and calibrated to the Jordanian economy, at the purpose of assessing the effects of trade liberalisation on Jordan. An

applied CGE model should have the following essential features: (i) consumers' endowments of production factors, (ii) consumers' preferences and demand functions for commodities, (iii) production technology available to firms, and (iv) set of equilibrium conditions. The model used in this paper incorporates also dynamics in the choice of optimal consumption and investment.

On the assumption that the data represent an equilibrium of the economy, functional parameters, such as share and shift parameters, are calibrated, i.e. they are estimated in such a way that the model solution reproduces the initial dataset, called benchmark equilibrium. However, some parameters, namely the elasticities, are taken exogenously from the existing literature.

Exogenous shocks are then implemented in the model, in order to compute a counterfactual equilibrium determined by the new policy regime. The impact of the policy changes is then assessed by comparison between counterfactual and benchmark equilibria.

As already stated above, this paper focuses on the dynamic effects on the Jordanian economy of establishing a free-trade area between the EU and Jordan. Using a dynamic CGE model, the impacts of gradually decreasing and eventually eliminating tariff barriers in Jordan for EU goods are estimated. However, as pointed out above, there may be the need of taking appropriate fiscal measures to counterbalance the adverse effects brought about by trade liberalisation. Therefore, the impact of the exogenous shock, i.e. the regional integration process with the EU, is assessed together with some endogenous policy choices, i.e. the accompanying fiscal actions taken by the government.

3 The Model

The model implemented is a simple neo-classical open-economy single-country intertemporal model. Discounted lifetime utility of the representative consumer is maximised by choosing optimal consumption and investment paths. In the domestic economy there are two production sectors, one producing goods and the other producing services. Production sectors will be denoted by the subscript $i = g, s$, where g stands for good and s for service. Perfect competition and full employment are assumed in both sectors. International trade flows are characterised by imperfect substitution between domestic and foreign goods. Final sectoral output Q is allocated across domestic sales D and exports E through a constant elasticity of transformation

(CET) function. Total sectoral absorption X an Armington composite of domestic good D and imported good M. It is differentiated among four uses: private consumption C, government consumption GC, intermediate input AQ, investment I. The parameters in the Armington functions are the same for all uses, as well as prices[3]. The domestic country is assumed to be a price-taker in the international markets, that is world prices of imports and exports are exogenously determined.

3.1 Consumers

On the demand side, the representative consumer chooses consumption and new capital so as to maximise her discounted lifetime utility, subject to the budget constraint, the motion equation of capital, the equality between savings and investment, and the given initial capital stock. The optimisation problem is given by:

$$\max_{\{C_t, K_{t+1}\}} U = \sum_{t=0}^{\infty} \left(\frac{1}{1+\rho}\right)^t \frac{C_t^{1-\nu}}{1-\nu},\ \rho > 0,\ \nu > 0,\ \nu \neq 1 \tag{1}$$

subject to

$$P_t^C C_t = Y_t - PS_t \tag{2}$$

$$I_t = K_{t+1} - (1-\delta) K_t,\ 0 < \delta < 1 \tag{3}$$

$$P_t^I I_t = PS_t \tag{4}$$

$$K_0 = \bar{K}_0 \tag{5}$$

where C_t and K_t are real aggregate private consumption and real aggregate capital in period t, Y is total net nominal income, ν is the inverse of the constant elasticity of substitution between consumption at any two points in time, ρ is the rate of time preferences at which consumers discount future utility, P^C is the supply composite price index faced by consumers, δ is the constant capital depreciation rate, I is aggregate real investment,

[3]This assumption is necessary because imports data are not disaggregated across private consumption, government consumption, intermediate inputs and investment. Therefore calibration of the Armington parameters is possible only in the aggregate Armington function.

P^I is the composite price of investment goods, PS is personal saving, and $\bar{K_0}$ is the given initial level of capital stock. Aggregate consumption C is a Cobb-Douglas composite of good and service consumption.

Consumer income Y_t is defined as

$$Y_t = \left(1 - t_t^Y\right) \left[w_t LS_t + \left(1 - t_t^K\right) r_t K_t + GT_t + FREM_t\right] \tag{6}$$

where LS_t is labour supply at period t, which is normalised to one, w is the wage rate, t^Y is the income tax rate, t^K is the capital rent tax rate, r is the rate of return to capital, GT is government transfer to households and $FREM$ are foreign remittances.

The Lagrangian for this discrete-time dynamic problem is

$$\begin{aligned} \mathcal{L} \;=\; & \sum_{t=0}^{\infty} \left(\frac{1}{1+\rho}\right)^t \frac{C_t^{1-\nu}}{1-\nu} + \\ & \sum_{t=0}^{\infty} \lambda_t \left\{ \begin{array}{c} \left(1 - t_t^Y\right) \left[w_t LS_t + \left(1 - t_t^K\right) r_t K_t + GT_t + FREM_t\right] \\ -P_t^I \left[K_{t+1} - (1-\delta) K_t\right] - P_t^C C_t \end{array} \right\} \end{aligned}$$

where the multipliers for the constraint (2) are denoted by λ_t.

The intertemporal condition for consumption is

$$\frac{C_{t+1}}{C_t} = \left\{ \left(\frac{1}{1+\rho}\right) \frac{P_{t+1}^I}{P_t^I} \frac{P_t^C}{P_{t+1}^C} \left[\left(1 - t_{t+1}^Y\right) \left(1 - t_{t+1}^K\right) \frac{r_{t+1}}{P_{t+1}^I} + 1 - \delta \right] \right\}^{\frac{1}{\nu}} \tag{7}$$

Household consumption of good $C_{t,g}$ and service $C_{t,s}$ are in turn composites of domestic and import goods, modelled through the standard Armington (1969) assumption of constant elasticity of substitution (CES) between domestically-produced consumption good CD and imported consumption good CM. Households choose the optimal level of domestic and import good and service for a given value of total consumption, by taking the Armington specification as constraint of the cost-minimisation static problem[4]:

$$\min_{CM_i, CD_i} P_i^C C_i = P_i^{MF} CM_i + P_i^D CD_i,\; i = g, s \tag{8}$$

$$\text{s.t.} \quad C_i = \Phi_i \left[\varepsilon_i \left(CM_i\right)^{\frac{\gamma_i - 1}{\gamma_i}} + (1 - \varepsilon_i) \left(CD_i\right)^{\frac{\gamma_i - 1}{\gamma_i}} \right]^{\frac{\gamma_i}{\gamma_i - 1}},\; 0 < \varepsilon_i < 1 \tag{9}$$

[4]For simplicity the time index in static equations is from now on dropped.

where P_i^{MF} and P_i^D are the consumer prices - i.e. they are inclusive of all taxes and import duties - of imported and domestic consumption good and service; γ_i is the elasticity of substitution between domestic goods and imports, Φ_i is the shift parameter, ε_i is the imports share parameter, and the subscript $i = g, s$ is the index for good and service sectors.

Reflecting the structure of the Social Accounting Matrix (SAM), aggregate imports of consumption goods are then disaggregated across three regions, i.e. Arab countries[5], the EU and the rest of the world, through a Cobb-Douglas specification. The optimisation problem for the households applies to good and service and is given by:

$$\min_{\{MC_i^j\}} P_i^{MF} CM_i = \sum_j P_i^{MFj} CM_i^j \tag{10}$$

$$\text{s.t.} \quad CM_i = \Phi_i^M \prod_j \left(CM_i^j\right)^{\varepsilon_i^j}, \ \sum_j \varepsilon_i^j = 1 \tag{11}$$

where CM_i^j is households consumption of foreign good imported from region $j = AR, EU, RW$, P^{MFj} is the price of good imported from region j inclusive of all taxes, Φ_i^M is the shift parameter, and ε_i^j is the share parameter of imports from region j. The elasticity of substitution between imports is therefore constant and equal to one, being the Cobb-Douglas specification a particular case of CES function.

3.2 Firms

On the supply side, constant returns to scale and perfect competition are assumed. Sectoral output in the domestic economy Q_i, $i = g, s$, is determined by a two-stage production process, which exhibits at the top tier a Leontief fixed-proportions specification between intermediate input AQ and value-added output F_i:

$$Q_i = \min \left\{ \frac{F_i}{a_{i,1}}, \frac{AQ_i}{a_{i,2}}, \frac{AQ_j}{a_{j,2}} \right\} \tag{12}$$

where $a_{i,1}$ and $a_{i,2}$ are the fixed requirements of valued-added output F_i and intermediate input AQ_i respectively, for production of aggregate output Q_i.

At the second tier, intermediate input AQ_i is an Cobb-Douglas composite of domestic and foreign intermediate consumption goods, AQD_i and AQM_i.

[5] Arab countries are Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan's Free Trade Zone, Kuwait, Lebanon, Lybia, Mauritania, Morocco, Oman, Palestinian Authority, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, the United Arab Emirates and Yemen.

Value-added production is determined by a technology characterised by a constant elasticity of substitution between the two primary inputs, capital K_i and labour L_i:

$$F_i = A_i \left[\alpha_i L_i^{\frac{\sigma_i - 1}{\sigma_i}} + (1 - \alpha_i) K_i^{\frac{\sigma_i - 1}{\sigma_i}} \right]^{\frac{\sigma_i}{\sigma_i - 1}} \\ 0 < \alpha_i < 1,\ \sigma_i > 0,\ \sigma_i \neq 1,\ i = g, s \tag{13}$$

where A_i is the time-invariant technological parameter, α_i is the labour share parameter and σ is the constant elasticity of substitution between labour and capital. At the value-added production stage, firms minimise costs, given by $wL_i + rK_i$, subject to the above technology constraint (13).

Sectoral production Q_i can be sold on the domestic market or abroad. Exports and domestic sales are modelled according to a constant elasticity of transformation (CET) function, that represents the constraint for the producer maximising total sales:

$$\max_{E_i, D_i^S} PP_i^Q Q_i = P_i^E E_i + PP_i^D D_i \tag{14}$$

$$\text{s.t.} \quad Q_i = \chi_i \left[\theta_i E_i^{\frac{1+\psi_i}{\psi_i}} + (1 - \theta_i) D_i^{\frac{1+\psi_i}{\psi_i}} \right]^{\frac{\psi_i}{1+\psi_i}} \tag{15}$$

where Q_i is total sectoral domestic production, E_i is exports, D_i is domestic supply, PP_i^Q is producer output price (i.e. net of taxes), P_i^E is producer exports price (which equals the world price of exports PW_i^E, given the absence of export subsidy), PP_i^D is producer domestic sales price (i.e. net of GST), θ_i is the export share parameter, χ_i is the shift parameter, and ψ_i is the elasticity of transformation between domestic good and export good, with $\psi_i > 0$.

Given the exports disaggregation provided by the SAM, total exports are allocated across three trading partners - Arab countries, the EU and the rest of the world - by means of the optimisation problem, in which a constant elasticity of transformation (CET) specification is adopted:

$$\max_{\{E_i^j\}} P_i^E E_i = \sum_j P_i^{Ej} E_i^j \tag{16}$$

$$\text{s.t.} \quad E_i = \chi_i^E \left[\sum_j \theta_i^j \left(E_i^j \right)^{\frac{1+\psi_i^E}{\psi_i^E}} \right]^{\frac{\psi_i^E}{1+\psi_i^E}}, \ \sum_j \theta_i^j = 1 \text{ for } j = AR, EU, RW \tag{17}$$

where sectoral exports E_i is given by regional exports E_i^{AR}, E_i^{EU} and E_i^{RW}, $P_i^{E,j}$ are producer export prices (all of them equal to PW_i^E), χ_i^E is the shift parameter, θ_i^j is the share parameter of exports to region $j = AR, EU, RW$, ψ_i^E is the elasticity of transformation between exports, and PE_i^j is the producer price of exports to region j.

The zero-profit condition for the firms ensures there is no extra-profit:

$$P_i^Q Q_i = P_i^X AQ_i + P_i^V F_i + vatd_i PP_i^D D_i \tag{18}$$

where $vatd$ is the VAT-rate on domestically-produced goods.

Intermediate inputs AQ and investment goods I are characterised by a CES Armington specification between domestic goods and total imports and by a Cobb-Douglas function for disaggregated imports. Given that functional parameters and prices are the same for all kinds of uses, optimal intermediate inputs and optimal investment are determined by (8)-(11).

3.3 Government

The government consumes an exogenous amount of good, raises taxes and tariffs, provides a transfer to consumers, and runs a balanced budget. Although at first sight the assumption of balanced budget might look unrealistic, it is actually appropriate for Jordan, given the current high level of government debt.

Government consumption is determined in the same fashion as in (8)-(11). Government revenue comes from the Value Added Tax (VAT), that applies with different rates to domestic and imported goods ($vatd_i$ and $vatm_i^j$, $i = g, s$, $j = AR, EU, RW$), the tax on capital rent (t^K), the income tax (t^Y), and import duties, that apply with three different rates to Arab countries, the EU and the rest of the world (tm_i^j). The expenditure is given by transfer to household GT, and consumption of good GC.

4 Data and Calibration

The dataset is based on the Social Accounting Matrix (SAM) for Jordan constructed by Lucke (2001). The SAM is based on 1998 data, and uses

the input-output coefficient matrix updated to 1998[6]. The original SAM has nine sectors producing goods and one sector producing services. The model is then simplified by aggregating all goods sectors. The domestic economy consists therefore of two sectors, producing respectively good and service. The base-year dataset is assumed to reflect a stationary steady state economy. Then parameters are calibrated in order to obtain a solution reproducing the benchmark equilibrium. All variables are then scaled, such that the initial labour force is normalised to one. The world prices of export PW_i^E and import PW_i^M are exogenously fixed to one. Real variables are then derived from the base-year nominal variables provided in the SAM.

Elasticity	Value	Source
Substitution between domestic good and import (γ)	0.6	Devarajan et al. (1997)
Transformation between domestic good and export (ψ)	6.867	Devarajan et al. (1999)
Transformation between regional export (ψ^E)	3	Martin (2000); Lucke (2001)
Substitution between labour and capital (σ)	0.9	Devarajan and Go (1998)
Inverse substitution in consumption (υ)	0.9	Devarajan and Go (1998); Blanchard and Fischer (1998)

Table 1. Elasticities.

The assumption of steady state allows to calibrate the dynamic parameters δ and ρ. From the capital accumulation equation (3) and from the stationary steady-state condition $K_{t+1} = K_t = K_{ss}$, it follows that the depreciation rate of capital is:

$$\delta = \frac{I_{ss}}{K_{ss}} \tag{19}$$

The steady-state intertemporal condition for private consumption, given by (7), allows then to calibrate the consumers' discount rate as:

$$\rho = \left(1 - t^Y\right)\left(1 - t^K\right)\frac{r_{ss}}{P_{ss}^I} - \delta \tag{20}$$

The steady-state conditions apply also as terminal conditions.

5 Simulations

The model is implemented by means of the mathematical software GAMS (General Algebraic Modeling System). The basic scenario, common to all simulations, is, of course, the gradual reduction of tariff rates on EU-import

[6] The 1998 input-output coefficients have been updated by Lucke and Feraboli (2005).

goods, provided by the EU-Jordan Agreement. There are four groups of commodities subject to different tariff-reduction schedules. Services are not part of the Agreement. Given that the model implemented has one imported good, the exercise simulating the EU-Jordan Agreement can be carried out by setting the import tariff rate over time according to the average of the schedule provided by the Agreement. This implies reducing gradually the base-year import duty at the entry into force of the Agreement until period 13, and then fixing the import charge for the next periods equal to that assumed in period 13.

Table 2 shows the timetable of the average of custom duty reduction. The numbers in the left column show the number of years after the date of entry into force of the Association Agreement (AA). Figures in the right column indicate the percentage of the base-year duty charged in the relevant period.

Period	Import duty rate
entry into force of the AA	70%
one year after	65%
two year after	60%
three year after	55%
four year after	45%
five year after	40%
six year after	35%
seven year after	30%
eight year after	25%
nine year after	22,5%
ten year after	20%
eleven year after	17,5%
twelve year after	12,5%

Table 2. Import duties reduction.

The immediate effect of a reduction in custom duties on imports of a specific trade partner can be seen by considering the first-order conditions for the Armington specification between imports and domestically-produced goods:

$$\frac{CM}{CD} = \frac{\varepsilon P^D}{(1-\varepsilon) P^{MF}} \tag{21}$$

and the first-oder conditions for the Cobb-Douglas function regional imports:

$$\frac{CM^j}{CM^k} = \frac{\varepsilon^j P^{MFk}}{\varepsilon^k P^{MFj}} \tag{22}$$

where $j, k = AR, EU, RW$.

Prices of regional imports are defined as:

$$P^{MFj} = PW^M \left(1 + tm^j\right) \left(1 + vatm^j\right) \tag{23}$$

where tm^j is the tariff rate on goods imported from region j and $vatm^j$ is the VAT rate applied to imports from region j.

From (23) above, a decrease in tm^{AR} will clearly reduce $P^{MF,AR}$. From (22) it follows that, ceteris paribus, regional imports CM^j are decreasing in the regional import price P^{MFj}. Moreover, since P^{MF} is a composite of $P^{MF,AR}$, $P^{MF,EU}$ and $P^{MF,RW}$, a fall in one or more regional imports prices will decrease P^{MF}. Therefore, a reduction in the tariff rate on EU import will determine a fall in the EU imports price and in the composite imports price, and a rise in EU imports.

The gradual reduction on the import duty rate decreases prices of imported goods. Domestic prices will also decrease. The fall in domestic prices boosts directly demand, investment might go up and output is expected to increase in the long-run. The loss in government revenue due to the import duty reduction is partially offset by the expansion in the tax base. The government must compensate the fall in revenue by undertaking counteracting fiscal measures, such as an increase in the domestic tax rates or a reduction in spending. Moreover, some intersectoral impact is expected. The sector in which trade openness takes place is likely to attract more resources in the long-run, although it might suffer from a short-run negative impact due to the move from protectionism to free trade.

The impact on welfare might be in principle ambiguous. On the one hand, lower domestic prices increase consumption and hence households' welfare. On the other hand, the reduction in government revenue due to cutting import duty rates forces the government to implement painful fiscal measures, i.e. increases in domestic tax rates and reduction in transfer to households. This will negatively affect disposable income of households, who must ceteris paribus reduce consumption. Such an impact on welfare is therefore negative. The overall impact on households' consumption and welfare depends therefore on the magnitude of the effects of lower consumption prices and lower disposable income. However, the simulations results show that under all scenarios of trade liberalisation welfare rises, as economic theory would suggest.

Table 3 lists the scenarios of two-policy simulations and summarises the effects on welfare. Trade policy is exogenous, it is established by the Association Agreement with the EU and is common to all scenarios, while fiscal

policy is determined endogenously. In the first scenario, the exogenous policy is the free trade agreement with the EU, and the reform of the domestic income taxation is the government endogenous policy choice. In scenario 2, the endogenous policy choice is government consumption. Finally, under the third scenario government transfer to households is endogenous.

Scenario	Fiscal policy variable	Welfare change (%)
S1	Income tax rate	1.254
S2	Government consumption	2.329
S3	Transfer to households	1.292

Table 3. Scenarios and welfare effects.

It is no surprise to find that welfare increase under simulation S2 is larger than under the other two simulations. Whereas in the remaining scenarios, i.e. S1 and S3, the policy choice implemented by the government reduces, ceteris paribus, household income and therefore private consumption and utility, the fall in government consumption does not play any role in utility of consumers. However, the credibility of such result might be argued, given that the govenrment is likely to face a problem of feasibility in reducing consumption.

The impact of trade liberalisation on domestic private consumption is shown in Figure 1, which depicts scenario S1. Household consumption after the FTA implementation is higher than the benchmark level. Then, as import tariffs and domestic prices decrease, consumption increases and thereafter it stabilises at the new steady-state level.

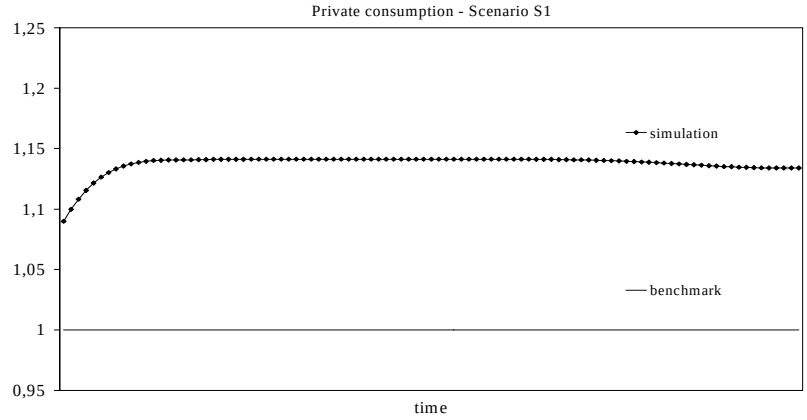

Figure 1. Impact of free trade on private consumption.

Figure 2 depicts the effect of the preferential trade agreement with the EU on capital stock. As pointed out above, the rise in domestic demand

due to the fall in prices has a positive impact on investment demand and hence on capital. Capital stock increases sharply relative to the benchmark level and then converges to the long-run steady-state level.

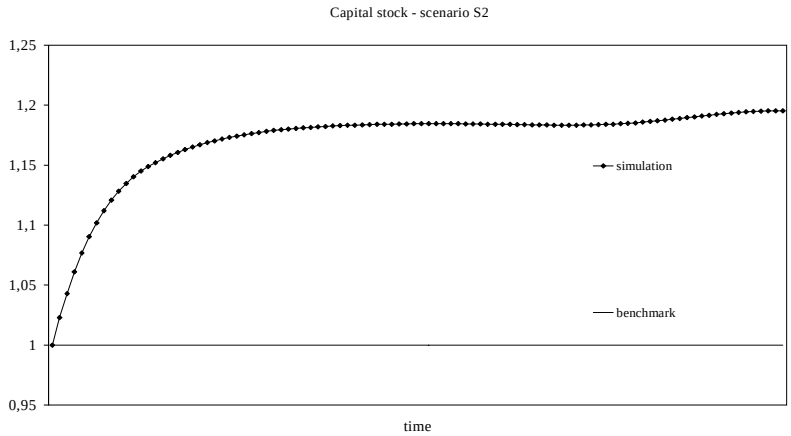

Figure 2. Effect of free trade on capital.

Finally, figures 3 and 4 show the endogenous fiscal tools used by the government to counteract the fall in revenue. In figure 3 the implications for fiscal policy under scenario S1 are depicted. The income tax rate should lie between 0.13 and 0.145, much higher than the initial value. Although this is clearly a simplification, since in reality the income tax rates are six, the simulation provides a clear and expected insight for fiscal policy reform.

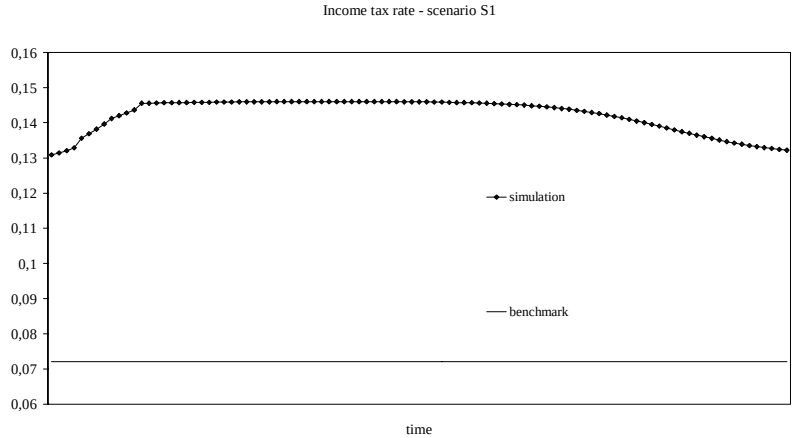

Figure 3. "Optimal" income tax rate.

The trend of "optimal" government consumption is depicted in Figure 4. Again, the result is not surprising. The Jordanian government is supposed

to undertake painful fiscal measures, i.e. reduction in spending, in order to counterbalance the fall in revenue that takes place after the implementation of the free trade agreement with the EU.

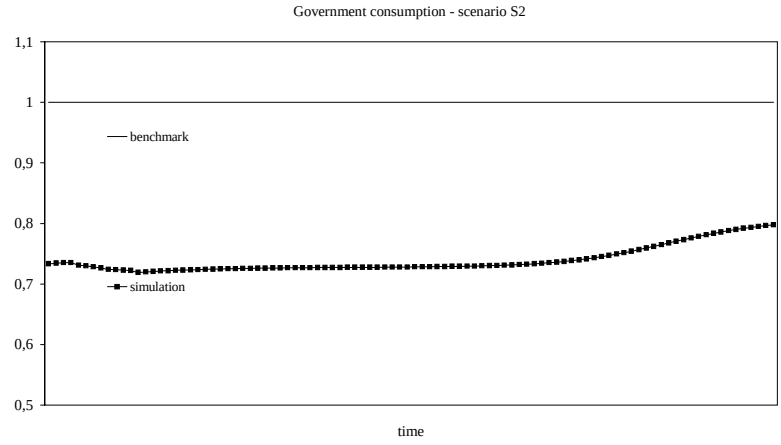

Figure 4. "Optimal" government consumption.

The fiscal policy tool used in scenario S3 is government transfer to households. Simulation yields a negative level for transfer, meaning therefore that the government should eliminate transfer and actually set up a lump-sum tax.

As mentioned abobe, trade liberalisation is expected to have sectoral effects. Figure 5 shows how output of good and service sectors is affected by opening up domestic trade in the good sector.

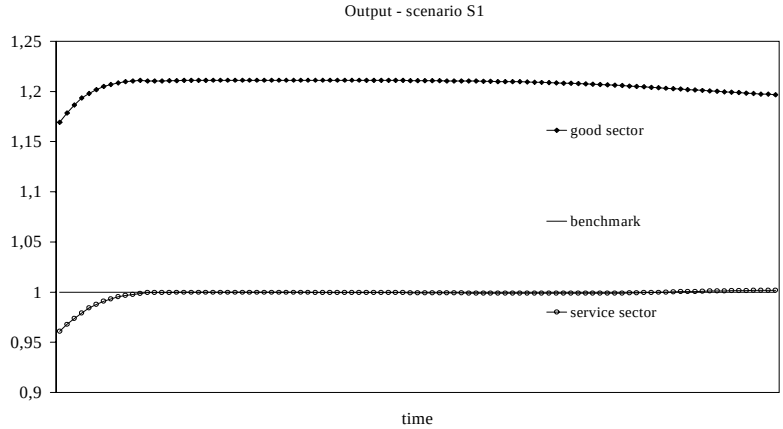

Figure 5. Sectoral impacts.

A shift of resources to the formerly protected sector takes place. This increases output in the good sector both in the short-run and in the long-run, i.e. there is no short-term negative impact on the formerly protected sector. The service sector is slightly negatively affected in the very short-run, given that production resources have been shifted to the other sector, but it is unaffected in the long-run.

Changing exogenously the values of the elasticities listed in Table 1 allows to see whether the above simulation results are sensitive to elasticities. All elasticities have been changed within a small range of values. However, the qualitative results provided above are unaffected.

6 Conclusions

This paper has assessed the bilateral trade liberalisation process undertaken by Jordan by means of a dynamic CGE model. In spite of its simplicity, this model is able to capture intertemporal and intersectoral effects on Jordan of opening up domestic trade. The implications for the Jordanian economy of the PTA with the EU have been analysed. The main conclusions drawn from the simulations are: (i) the Association Agreement with the EU brings about in Jordan positive long-run effects on investment, capital, output and GDP; (ii) the impact of trade liberalisation on welfare is positive under all scenarios; and (iii) the government should counteract the negative impact of opening up domestic trade on government revenue by implementing fiscal policy reforms.

References

[1] Abed, G.T., 1998, Trade Liberalization and Tax Reform in the Southern Mediterranean Countries, IMF Working Paper 49.

[2] Armington, P.S., 1969, A Theory of Demand for Products Distinguished by Place of Production, IMF Staff Papers 16, 159-176.

[3] Blanchard, O.J. and Fischer, S., 1998, Lectures on Macroeconomics, MIT Press.

[4] Devarajan, S., Lewis, J.D. and Robinson, S., 1990, Policy Lessons from Trade-Focused, Two-Sector Models, Journal of Policy Modeling, 12(4), 625-657.

[5] Devarajan, S., Go, D.S., Suthiwart-Narueput, S. and Voss, J., 1997, Direct and Indirect Fiscal Effects of the Euro-Mediterranean Free Trade Agreements, Paper presented at the Mediterranean Development Forum, Knowledge and Skills for Development in the Information Age, Marrakech, Morocco, May 12–17.

[6] Devarajan, S. and Go, D.S., 1998, The Simplest Dynamic General-equilibrium Model of an Open Economy, Journal of Policy Modeling, 20(6), 677-714

[7] Devarajan, S., Go, D.S. and Li, H., 1999, Quantifying the fiscal effects of trade reform: A general equilibrium model estimated for 60 countries, World Bank Policy Research Working Paper 2162.

[8] Francois, J.F., McDonald, B.J. and Nordström, H., 1997, Capital Accumulation in Applied Trade Models, in Francois, Joseph F. and Reinert, Kenneth A. (eds.), Applied Methods for Trade Policy Analysis.

[9] Hosoe, N., 2001, A General equilibrium analysis of Jordan's trade liberalization, Journal of Policy Modeling, 23, 595-600.

[10] Lucke, D., 2001, Fiscal Impact of Trade Liberalization: The Case of Jordan, FEMISE Research Programme Final Report.

[11] Lucke, B., 2001, Fiscal Impact of Trade Liberalization: The Case of Syria, FEMISE Reserach Programme Paper.

[12] Lucke, B., and Feraboli, O., 2005, Update of the 1987 Input-Output Matrix for Jordan, Discussion Paper, University of Hamburg, forthcoming.

[13] Martin, W., 2000, Assessing the Implications for Lebanon of Free Trade with the European Union, World Bank, Development Research Group.